Wood Packaging and Fumigated Containers in Sea Transport

A practical guide to ISPM 15 and IMDG Code 5.5.2



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For shippers, freight forwarders, carriers, port operators and personnel receiving or unloading containers.

Guidebook edition revised 28 October 2026

Contents

1 Understanding the two requirements....3

2 Wood packaging within scope....4

3 Debarking and treatment....5

4 The IPPC mark and continued use....6

5 Destination country requirements....7

6 Fumigated containers and UN 3359....9

7 Ventilation marking and documentation....10

8 Carriage aboard ship....11

9 Fumigants detection and unloading....12

10 Practical shipment checklist....13

11 Notes on this edition....14

References....16

About this ebook

I published two articles on shashikallada.com in July 2026: one on ISPM 15 wood packaging requirements and the other on fumigated cargo transport units at sea. I have brought them together in this ebook for shippers, freight forwarders, carriers, port operators and those who receive and unload containers.

My purpose is to make these requirements easier to consult when preparing and handling a shipment. The distinction matters: an IPPC mark confirms the treatment of wood packaging; it does not establish whether a container has been ventilated or is safe to enter.

The chapters follow the shipment from wood packaging and treatment to sea carriage and unloading. Chapter 11 states the basis of this edition and the points that depend on circumstances.
Shashi Kallada

1 Understanding the two requirements

ISPM 15 is International Standard for Phytosanitary Measures No. 15, issued through the International Plant Protection Convention under FAO. It addresses pests associated with raw wood packaging used in international trade. National Plant Protection Organisations implement the standard through national controls.

The standard covers packaging supporting, protecting or carrying a consignment, regardless of the cargo. Untreated blocking or bracing timber can therefore create a compliance problem even when the main cargo has no plant-health significance.

IMDG Code 5.5.2 addresses fumigated cargo transport units, identified as UN 3359. Here the concern is the fumigant atmosphere inside the unit and the safety of people transporting, opening or entering it. The cargo need not be wood.

Subject	ISPM 15	IMDG 5.5.2
Focus	Wood packaging material	Fumigated cargo transport unit
Evidence	IPPC treatment mark	Fumigation warning mark and applicable transport information
Main decision	Is the wood within scope and compliant?	Has the CTU been completely ventilated before transport?

How the requirements meet

A consignment can contain ISPM 15-treated pallets and also be fumigated inside its container. Both subjects then need attention. Conversely, heat-treated pallets do not by themselves make the container a fumigated CTU, and fumigating a loaded container does not by itself establish that every piece of packaging has been treated and marked in accordance with ISPM 15.

Treatment does not prevent later infestation

ISPM 15 measures are not intended to provide ongoing protection against reinfestation. Packaging condition and evidence of pests still matter at import. A readable mark is compliance evidence for the wood packaging; it is not a guarantee that the whole shipment will meet every additional national biosecurity requirement.

2 Wood packaging within scope

Covered materials

ISPM 15 covers raw hardwood and softwood packaging above 6 mm in thickness, including crates, boxes, packing cases, pallets, cable drums, spools and reels. Dunnage used for blocking, bracing or securing cargo is also covered.

Check loose timber as well as the constructed packaging. A container with correctly marked pallets can still contain noncompliant dunnage.

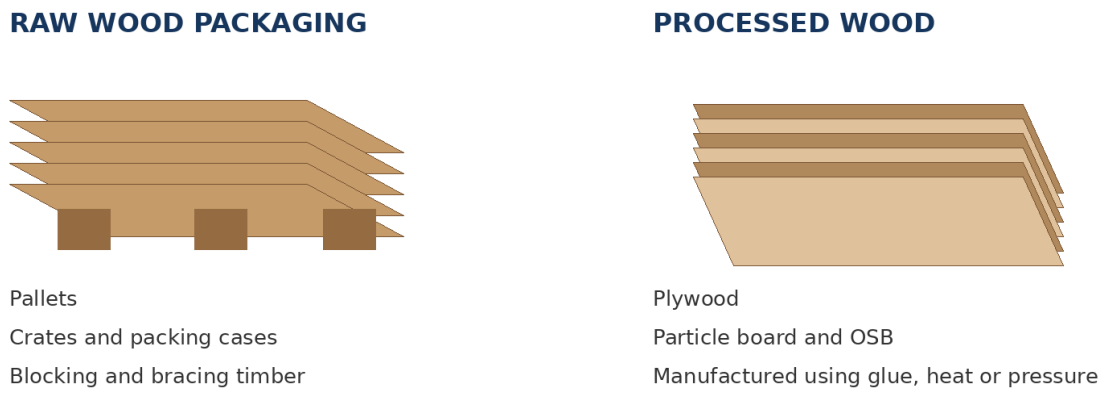


Figure 1 Raw and processed wood packaging materials Schematic illustration

Exemptions

- Wood 6 mm or less in thickness.
- Packaging made entirely from processed wood such as plywood, particle board, oriented strand board or veneer produced using glue, heat, pressure or a combination of these.
- Wine and spirit barrels heated during manufacture.
- Gift boxes for wine, cigars and other commodities made from wood processed or manufactured in a way that renders it free of pests.
- Sawdust, wood shavings and wood wool.
- Wood components permanently attached to freight vehicles and containers, including the container’s own wooden floor.

The barrel and gift-box exemptions depend on how the products are manufactured. Where pest freedom is doubtful, the importing NPPO may regulate the product.

Mixed construction and repairs

Processed-wood packaging combined with solid-wood components cannot be assumed wholly exempt. The regulated components need compliant treatment and marking arrangements. Adding untreated solid wood to a treated pallet creates a compliance defect; repairs must follow the rules in Chapter 4.

Common mistakes

- Checking pallets but overlooking loose blocking and bracing timber.
- Assuming debarked wood needs no further treatment.
- Assuming a predominantly plywood unit is exempt despite raw-wood components.
- Treating the absence of an IPPC mark on the container's permanently attached floor as a packaging defect.

3 Debarking and treatment

Debarking

Wood packaging must be made from debarked wood. Separate, clearly distinct bark patches may remain where each is less than 3 cm wide, regardless of length, or where a patch wider than 3 cm has an individual area less than 50 cm². Assess each patch individually.

Debarking must precede MB and SF fumigation. For heat treatment it may occur before or after treatment; remaining bark is included when an applicable dimensional limit is measured.

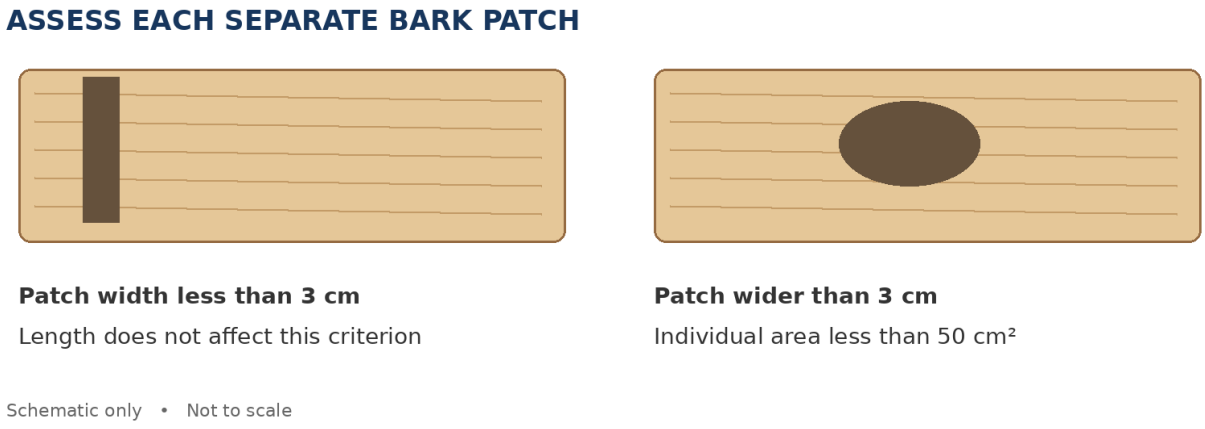


Figure 2 Separate bark patches are assessed individually Not to scale

Approved treatment methods

Code	Method	Principal parameters
HT	Conventional heat treatment	At least 56°C throughout the wood profile, including the core, for at least 30 continuous minutes.
DH	Dielectric heating	At least 60°C throughout the entire wood profile, including its surface, for at least 1 continuous minute.
MB	Methyl bromide	At ≥21°C: CT at least 650 g·h/m³ over 24 h; final concentration at least 24 g/m³. Higher values apply at lower temperatures.

Code	Method	Principal parameters
SF	Sulphuryl fluoride	At ≥30°C: CT 1,400 g·h/m³ over 24 h; final ≥41 g/m³. At ≥20°C: CT 3,000 g·h/m³ over 48 h; final ≥29 g/m³.

CT means concentration–time product. Treatment must follow a schedule specified or approved by the NPPO. The figures above explain the treatment requirements; the treatment provider must use the applicable approved schedule.

Treatment limitations

MB must not be used where a wood piece exceeds 20 cm in cross-section at its smallest dimension. Minimum wood and surrounding-air temperature is 10°C, and minimum exposure is 24 hours. An initial dose of 48 g/m³ at ≥21°C is an example schedule, not a substitute for achieving the required CT and final concentration.

SF must not be used on wood exceeding 20 cm in cross-section at its smallest dimension or above 75% moisture content on a dry basis. Wood temperature, including its core, must remain at least 20°C during treatment. Both fumigation methods require prior debarking.

The 2018 DH provisions require the specified temperature and holding time throughout the wood profile. They do not retain the earlier condition to reach the target within 30 minutes. Treatment acceptance at destination must also be confirmed.

4 The IPPC mark and continued use

Components and appearance

The mark comprises the IPPC symbol, a two-letter ISO country code, an NPPO-assigned producer or treatment-provider code, and the treatment code HT, DH, MB or SF. The symbol is placed to the left of the codes, within a rectangular or square border with a vertical dividing line.

The mark must be legible, durable, non-transferable and visible in use, preferably on at least two opposite sides. It must not be hand-drawn. Red and orange should be avoided because they are used for dangerous goods labelling.

Additional information, including any dunnage designation, belongs outside the official mark’s border. “DUN” is not a required ISPM 15 code. Older marks consistent with previous editions should be accepted on import; an old DB designation does not replace a treatment code.

Loose dunnage

Each cut piece used as dunnage needs a complete, clear mark. Cutting a marked length of timber can leave pieces without the complete mark; check this before loading.

Validity and reuse

There is no calendar expiry on an ISPM 15 mark. Compliant wood packaging that has not been repaired, remanufactured or otherwise altered does not need routine retreatment or remarking. Treatment does not prevent later reinfestation.

Repair

Repair involves removal and replacement of up to approximately one-third of the components. Replacement wood must be treated and each added treated component individually marked, or the replacement material must be exempt processed wood. The NPPO may instead require previous marks to be obliterated and the whole unit retreated and remarked. Where treatment or origin is doubtful, appropriate action is needed.

Remanufacture

Replacement of more than approximately one-third of the components constitutes remanufacture. Previous marks must be permanently obliterated and the unit retreated and marked anew.

Multiple marks on one unit are not by themselves evidence of noncompliance, although they can complicate traceability. Illegible marks, untreated repairs and hand-drawn marks remain practical rejection risks.

5 Destination country requirements

ISPM 15 is a harmonising standard implemented through national requirements. Confirm destination-country rules before specifying a treatment, and distinguish controls for wood packaging from controls for timber or bamboo carried as cargo.

European Union

The European Commission’s import guidance requires regulated wood packaging and dunnage from non-EU countries to be debarked, heat treated or fumigated in accordance with ISPM 15, and officially marked. Restrictions on using methyl bromide within the EU should not be confused with acceptance of packaging treated outside the EU. [R3]

United States

APHIS identifies both HT and MB marks for imported wood packaging. Packaging must be pest-free, debarked, appropriately treated and marked. Check the applicable US import requirements before selecting a treatment method. [R4]

Australia

Australia accepts ISPM 15-compliant packaging through its BICON framework, with additional seasonal measures such as those relating to brown marmorated stink bug risk. Check the current season, shipment route and commodity requirements; a valid IPPC mark alone may not satisfy those additional controls.

India

India implements ISPM 15 alongside separate requirements under the Plant Quarantine (Regulation of Import into India) Order, 2003 for timber and wood or bamboo products. These include a methyl bromide schedule of 48 g/m³ for 24 hours at 21°C or above, or an approved equivalent, where applicable. Check the commodity and entry conditions; this is not a universal rule for all unmarked timber.

Before booking

- Confirm the packaging material and treatment code with the supplier.
- Check the importing NPPO's requirements and additional biosecurity conditions.
- Check the carrier's acceptance requirements for any fumigation in transit.
- Retain relevant treatment and shipment records without confusing them with the official IPPC mark.

6 Fumigated containers and UN 3359

A fumigated CTU contains goods or materials fumigated within the closed unit. The provisions apply regardless of whether the cargo or packaging is wood. Grain, timber, machinery packing, textiles and other goods may be involved.

Fumigation uses a gas to reach cracks, voids and material that surface treatments cannot readily reach. Exposure schedules need to address resistant pest life stages, not only visible adult insects.

Scope of IMDG 5.5.2

- A fumigated CTU containing no other dangerous goods is subject to the specific provisions of IMDG 5.5.2.
- If other dangerous goods are present, their normal marking, placarding, documentation and segregation provisions also apply.
- Only CTUs that can be closed to minimise gas escape may be used for transport under fumigation.
- Persons engaged in the handling of fumigated CTUs must be trained commensurate with their responsibilities (5.5.2.2).
- The Dangerous Goods List (3.2) and 5.4.3 apply to all fumigated CTUs, UN 3359 (5.5.2.1.4). UN 3359 has stowage category B and SW2.
- Fumigants must not be applied to a CTU’s contents after the unit has been loaded aboard the ship.

The preloading decision

Establish whether the unit has been completely ventilated before transport. Opening its doors for a period is not, by itself, proof that harmful fumigant concentrations have been removed. Record the confirmed ventilation status and communicate it through the appropriate mark and documents.

Before loading, establish whether the unit has been completely ventilated or will be carried under fumigation. A unit carried under fumigation needs the applicable documentation and shipboard arrangements. A ventilated unit retains its warning mark until the fumigated goods have been unloaded.

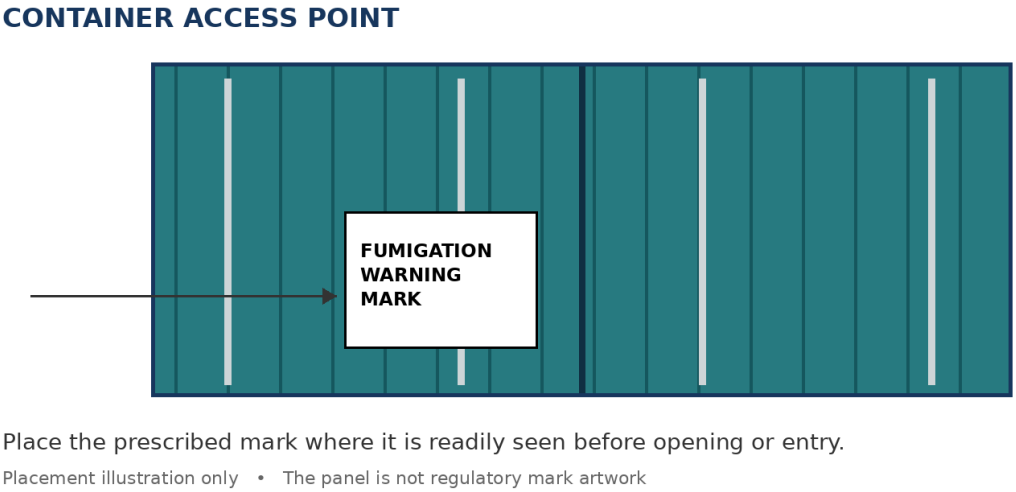


Figure 3 Warning mark placement at the container access point Schematic illustration

Time between treatment and loading

A period of 24 hours is normally sufficient for reasonably uniform fumigant distribution before loading, not a fixed mandatory waiting period. The actual interval depends on the competent authority, fumigant, amount, commodity and temperature. This interval must not be confused with proof of completed ventilation or safe entry.

7 Ventilation marking and documentation

Requirement	Completely ventilated before transport	Not completely ventilated
Warning mark	Retained; ventilation date entered	Retained without ventilation date
UN 3359 transport document	Not required when the specified ventilation and marking conditions are met	Required
Disposal instructions (5.5.2.4.3)	5.5.2.4.4 relieves the document only; assess residues and devices before opening	Required for residual fumigant and devices
Dangerous Goods List and 5.4.3 (5.5.2.1.4)	Apply	Apply
Warning mark removal	Only after ventilation and unloading	Not removable while these conditions remain unmet

Warning mark

Affix the fumigation warning mark at each access point where it will be readily seen by anyone opening or entering the unit. Minimum dimensions are 400 mm wide × 300 mm high, with an outer line at least 2 mm wide. It uses black print on white, with lettering at least 25 mm high.

The marking method must keep the information identifiable on a CTU that survives at least three months' immersion in the sea (5.5.2.3.2).

The mark carries the fumigant identification and application date and time, with the ventilation date added when appropriate. It remains until harmful fumigant concentrations have been removed by ventilation and the fumigated goods have been unloaded.

Fumigation alone does not require a Class 9 placard. Other Class 9 goods inside can independently require their normal placards.

Documents for units not completely ventilated

- UN 3359, FUMIGATED CARGO TRANSPORT UNIT, 9.
- Date and time of fumigation.
- Type and amount of fumigant used.
- Instructions for disposing of residual fumigant, including fumigation devices where used.

The information may be supplied in any suitable document format, provided it is identifiable, legible and durable. Record the unit and its location on the special list, manifest or stowage plan.

The exemption in 5.5.2.4.4 relieves the document only. Under 5.5.2.1.4 the Dangerous Goods List entry and 5.4.3 still apply to a ventilated unit. Ventilation does not prove that all devices or residues have been removed, so residual-material and entry risks still need assessment.

8 Carriage aboard ship

MSC.1/Circ.1361/Rev.1 provides recommendations for the safe carriage of fumigated cargo transport units. Read these recommendations alongside the mandatory IMDG provisions and the requirements implemented by the ship's flag State.

Before loading

Check the unit for leakage and seal identified leaks. Inform the master before loading. Provide appropriate training for at least one officer and one other crew member designated as the master's trained representatives, with crew briefing before the unit is loaded.

Stowage

UN 3359 is assigned stowage category B, with SW2 in column 16a. On- or under-deck carriage is permitted, clear of living quarters, with a minimum 3 m distance from accommodation, air intakes, machinery spaces and other enclosed work areas. On-deck stowage is preferred for non-ventilated units.

Ventilation and detection

For under-deck stowage, provide mechanical ventilation sufficient to keep fumigant levels below occupational exposure limits, at no less than two air changes per hour

based on the empty cargo space. Suitable detection equipment for the specific fumigant, with instructions, is needed. Appropriate detection equipment is also recommended for on-deck carriage.

Resources and arrival information

The recommendations call for at least four sets of suitable respiratory protective equipment, the fumigant SDS or manufacturer's guidance, and emergency medical information such as MFAG. They also call for notifying destination and port-of-call authorities, generally at least 24 hours before arrival, identifying the fumigant, treatment date and affected cargo spaces.

Ventilated units

The fumigation-in-transit arrangements are described for units not ventilated before loading. Complete ventilation changes that transport status, but it does not remove the need to assess residual-gas hazards before opening, entry or unloading.

Source of the shipboard arrangements

The detailed shipboard arrangements in this edition are carried forward from my July 2026 article and follow MSC.1/Circ.1361/Rev.1 as summarised there. Consult the circular and the applicable IMDG Code when preparing a vessel operating procedure.

9 Fumigants detection and unloading

Fumigants used for pest control

Phosphine is released when aluminium or magnesium phosphide formulations react with moisture. Sachets, tablets, plates and grey residues may be visible. Moisture reaching incompletely reacted material can release more gas. Odour is not a reliable clearance method.

Methyl bromide is applied as a gas and gives no dependable visual or odour warning. Treatment is relatively rapid, normally under 48 hours, and requires expertise. Assess the atmosphere with gas testing.

Sulphuryl fluoride is a compressed gas, colourless and odourless, and heavier than air. Warning-agent use depends on the product and authorised application; chloropicrin must not be assumed to accompany every container treatment.

Other fumigants include chloropicrin, hydrogen cyanide, formaldehyde, 1,3-dichloropropene, dazomet, methyl isocyanate and iodoform. Some are mainly soil or preplant fumigants, not common sea-container treatments. Chloropicrin is strongly irritating; hydrogen cyanide's reported bitter-almond odour cannot be detected by everyone; formaldehyde is pungent and irritating. None provides a sound basis for clearing a CTU by smell.

Undeclared fumigation

Indicators include taped vents or seals, packets or powder inside, unusual odours, and cargoes such as grain, timber and dried foods. An absent mark does not establish absence of fumigant. These indicators are grounds for investigation, not substitutes for testing.

Detection methods

- Stain tubes: select the tube for the gas concerned; observe expiry dates and temperature limits. Sampling through a lance can be carried out from outside the unit.
- Electronic testing: confirm that the sensor detects the relevant gas. PID instruments can have cross-sensitivity and do not measure oxygen unless a separate oxygen sensor is fitted.
- Personal monitors: useful for ongoing warning during work; suitability depends on the gas and instrument.

An oxygen reading alone does not prove freedom from fumigants. Carry out a risk assessment and appropriate gas testing before entry, including when the unit is declared ventilated.

Unloading

Ventilate as long as practicable and unload from front to back rather than tunnelling into the cargo. Fumigant can desorb from cargo and packaging over days. Previously ventilated units may therefore need reassessment when reopened. Handle residual materials through the applicable competent arrangements.

10 Practical shipment checklist

Use this checklist when preparing a shipment and arranging its receipt. It should be read alongside the treatment provider’s procedure and the vessel’s entry and fumigation arrangements.

Wood packaging

- Identify regulated raw-wood packaging and every piece of dunnage.
- Check exemptions against actual construction and processing.
- Check debarking and treatment compliance.
- Check complete and legible IPPC marks, including cut dunnage.
- Check repairs and remanufacture; investigate doubtful treatment or origin.
- Check destination requirements and additional biosecurity conditions.

Fumigated container before transport

- Identify whether fumigation occurred within the CTU.
- Establish complete ventilation status rather than assuming it from elapsed time.
- Check warning marks at every access point and enter the ventilation date where applicable.

- For a unit not completely ventilated, provide UN 3359 information, treatment details and residual-fumigant disposal instructions.
- Apply the normal requirements for any other dangerous goods inside.
- Arrange carrier acceptance and master notification for fumigation in transit.
- Check leakage, stowage, equipment, training and arrival-notification arrangements.

At receipt and unloading

- Look for undeclared fumigation indicators even when no mark is present.
- Assess the atmosphere and test with equipment suitable for the fumigant.
- Reassess a previously ventilated unit where residual or desorbed gas is possible.
- Control entry, ventilate and unload without tunnelling into cargo.
- Address residues or devices through appropriate disposal arrangements.
- Remove the warning mark only after ventilation and unloading are both completed.

11 Notes on this edition

This chapter states the basis of the edition and the points that depend on circumstances outside the Code and the standard.

Treatment and marking figures

The bark limits, the HT, DH, MB and SF parameters and the marking rules follow ISPM 15 Annexes 1 and 2 as revised in 2018 (R2). A bark patch qualifies when its area is less than 50 cm². DH requires 60°C for 1 continuous minute throughout the profile; the older 30-minute heating condition does not apply. Additional information such as DUN belongs outside the border of the official mark.

Destination rules

The EU guidance (R3) does not state that newly MB-treated imported packaging is refused. APHIS (R4) lists HT and MB import marks. National rules change, and the summaries in Chapter 5 are as at 9 October 2026.

Ventilated units and residues

The transport-document exemption in 5.5.2.4.4 relieves the document only. The Dangerous Goods List entry and 5.4.3 still apply to all fumigated CTUs (5.5.2.1.4). Ventilation does not establish that all devices or residues have been removed, and gas can desorb from cargo, so the exemption is not evidence of safe entry. The Code requires disposal instructions to be provided (5.5.2.4.3) and does not say who carries out the disposal.

Fumigants and instruments

Application of phosphide formulations, the use of chloropicrin with SF, and the availability of personal monitors depend on the product, the authorisation and the gas. Follow the product label and the instrument maker’s guidance.

Durability of the warning mark

The warning mark must remain identifiable on a CTU that survives at least three months' immersion in the sea (5.5.2.3.2).

Pests and timber cargo

Brown marmorated stink bug is a seasonal import risk in some countries and is not presented here as a wood-boring pest of packaging. Raw timber carried as cargo is a separate matter from wood packaging. The India summary applies to the commodities named in the 2003 Order, not to all unmarked timber.

Shipboard arrangements

The shipboard recommendations are carried forward from my July article and are identified separately from the mandatory IMDG requirements.

References

R1a ISPM 15 article by Shashi Kallada 9 July 2026 Open source

R1b Fumigated CTUs article by Shashi Kallada 13 July 2026 Open source

R2 IPPC ISPM 15 2018 annex revision published 2019 Open source

R3 European Commission wood packaging and dunnage Open source

R4 USDA APHIS importing compliant wood packaging Open source

R5 IMO MSC 1 Circ 1361 Rev 1 28 April 2022 hosted copy Open source

R6 UK MCA MGN 700 M Open source

R7 IPPC national contact points Open source

Regulatory basis: IMDG Code Amendment 42-24, section 5.5.2; ISPM 15 and its approved treatment and marking annexes. Destination summaries are as at 9 October 2026. National requirements may change.

Wood packaging and container safety

ISPM 15 and fumigated cargo transport units at sea



Check the wood packaging before shipment. Confirm the container's fumigation status before transport. Assess the atmosphere before entry or unloading.

About this ebook

I have combined my articles on ISPM 15 and fumigated cargo transport units into this ebook for the benefit of the shipping industry. It brings the requirements together in one place for those preparing shipments, accepting containers, carrying them at sea and arranging their unloading.
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Cover artwork is an illustrative image. Technical diagrams are schematics; the container warning panel shown is not a regulatory mark template.